



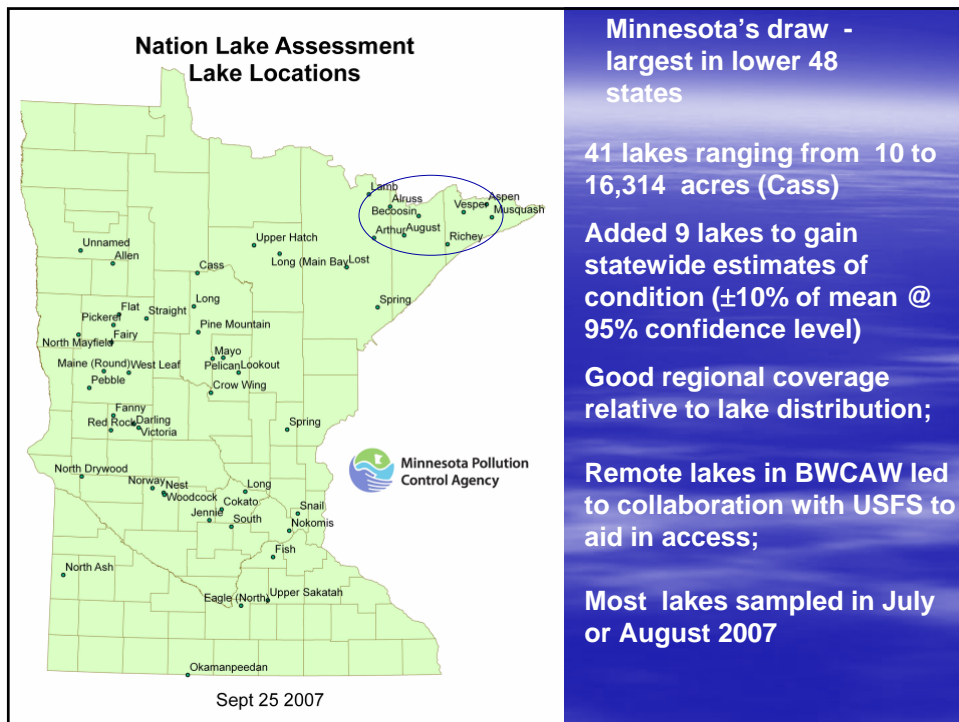
National Lakes Assessment Project
Enhancements for Minnesota.
Presented at: SWIMS 2008
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MN Pollution Control Agency
Developed in collaboration with Jesse Anderson,
Matt Lindon, & Kelly O'Hara MPCA
and
Michael Duval,
MN Department of Natural Resources



Minnesota Pollution
Control Agency

Minnesota's NLAP

- Part of a statistically-based assessment of the Nation's lakes conducted by USEPA;
- MPCA and MN Department of Natural Resources primary collaborators on this study;
- Included value-added sampling to NLAP;
 - 1) **provide an overview;**
 - 2) **examples of data sets & tentative hypothesis;**
 - 3) **examples of analyses to date**

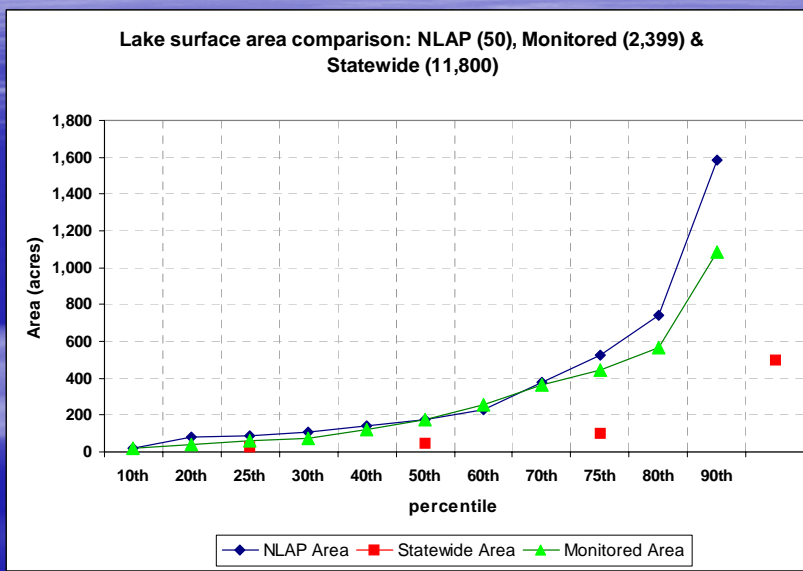


MN: Additional parameters & add-ons

- **Microcystin** – MPCA pelagic & nearshore comparison
- **Algal composition** – evaluate MPCA rapid assessment technique;
- **Water Hg**– collaborate with USGS (Dr. Krabbenhoft, WI)
- **Water pesticides** – collaborate with MN Dept. of Ag.;
- **Sediment contaminants** – samples for metals & trace organics;
- **Macrophyte assessment** – MDNR identified rooted plants & maximum rooting depth at each of 10 nearshore sites;
- **Fish IBI** – MDNR advanced IBI to additional lakes;
- **Multi-state assessment of Prairie Pothole Region**;

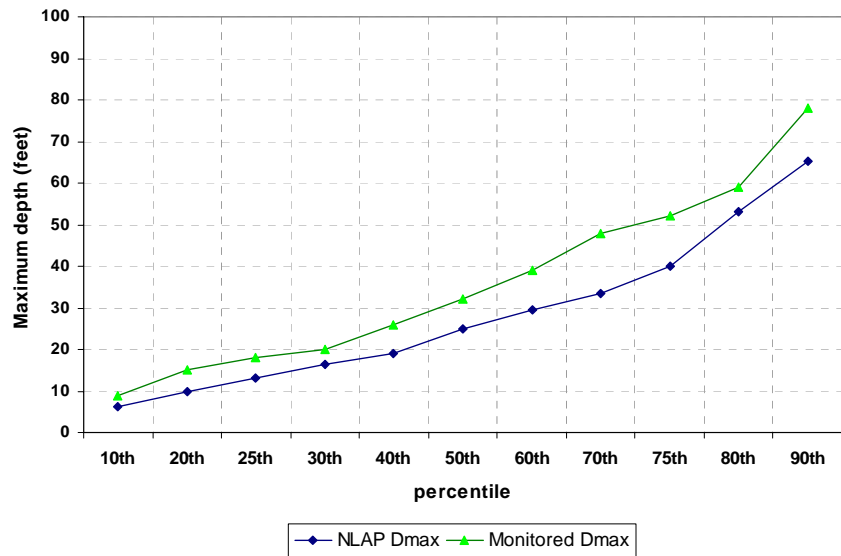
Data overview: Are NLAP lakes representative of MN lakes??

NLAP weighted toward larger lakes by design, but distribution is similar to lakes we have assessed.



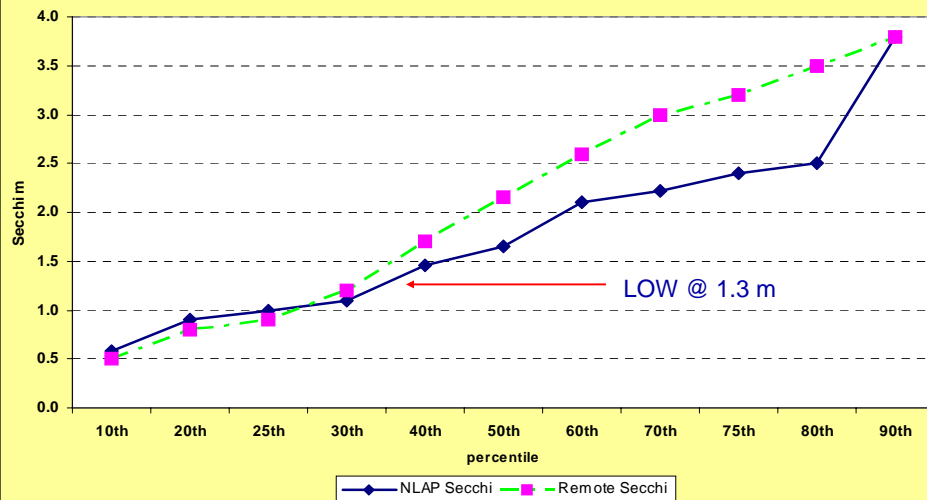
Depth distribution of NLAP similar to Monitored lakes

Maximum depth: NLAP (50) compared to Monitored (1,849)

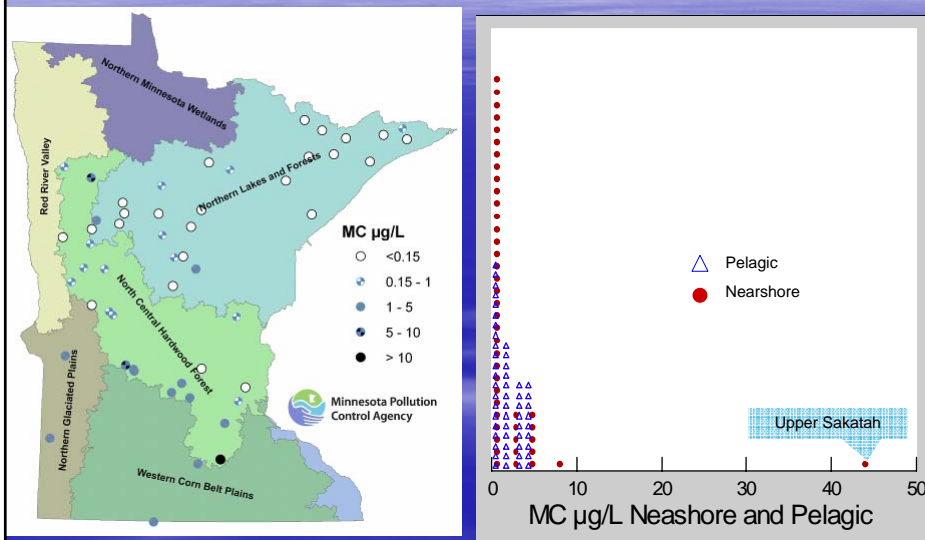


Frequency distributions - example of how we will apply data, e.g. H: NLAP Secchi (N=50) provides a realistic distribution of late summer Secchi. Test by comparison with remote sensed (N=10,500) Secchi. Test by comparison with remote sensed (N=10,500) Secchi

Late Summer Secchi Distributions: NLAP (50) & Remote Sensed (10,500)

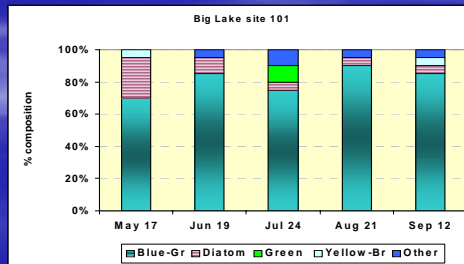


MC regional patterns & comparison of pelagic vs. near-shore



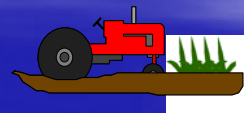
Algal assessment

- Rapid assessment yields dominant forms;
- NLAP - Collect samples at pelagic (for detailed taxonomy) and random near-shore site (#10)
- 1. Compare results from detailed NLAP taxonomy H: **Rapid assessment of dominant forms is not significantly different from the detailed assessment.**
- 2. Describe mid-summer dominant forms on a statewide basis;
- 3. Compare pelagic to near-shore H: **There is no significant difference in dominant algal forms between pelagic & near-shore sites.**
- 4. Status: Rapid assessment done – analysis underway;



Water Pesticides: MN Department of Agriculture

- MDA monitors pesticides in water;
- Analyzed samples for 25 base neutral pesticides and their degradates (e.g. Atrazine, Alachlor, Metalochlor & Malathion);
- Allow for an unbiased assessment of pesticide concentrations across MN;
- Includes lakes/regions where sampling might otherwise not be conducted;
- Compare values to aquatic life benchmarks;



2007 MN Lakes Pesticide Data

	ug/L	ug/L	ug/L	ug/L
	Acetochlor	Atrazine	Dimethenamid	Metolachlor
Average	0.025	0.06	0.025	0.035
Median	0.025	0.025	0.025	0.035
Maximum	0.025	0.68	0.025	0.035
Detection Frequency	2%	87%	4%	4%

(n = 55 samples)

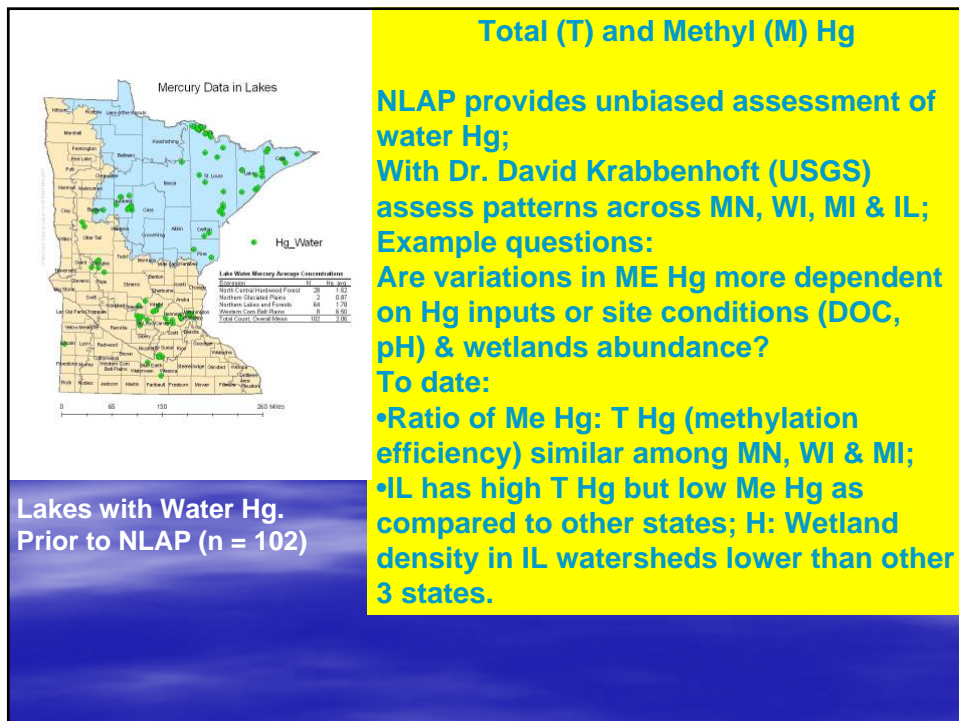
MN Aquatic Life Standards:

- Acetochlor (draft) – 3.6 ug/L
- Atrazine – 10 ug/L
- Metolachlor (draft) – 23 ug/L

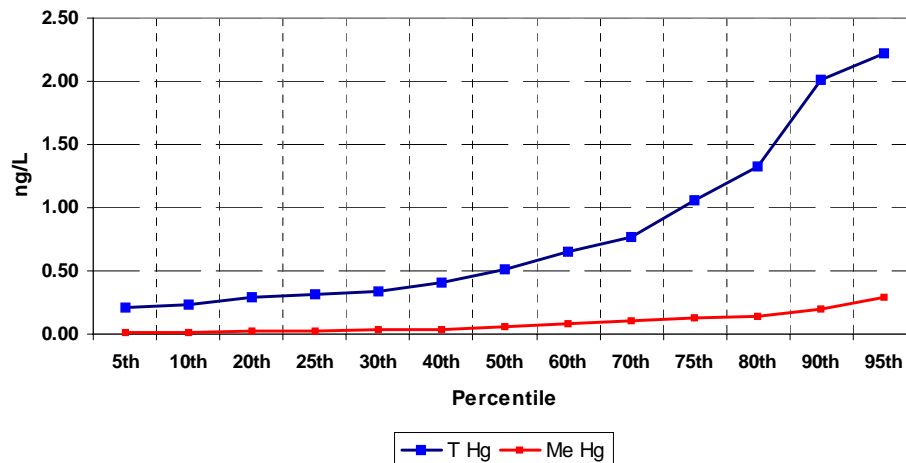
2007 MN Lakes Pesticide Data Degradates

	ug/L Acetochlor ESA	ug/L Acetochlor OXA	ug/L Alachlor ESA	ug/L Deisopropyl atrazine	ug/L Desethyl atrazine	ug/L Metolachlor ESA	ug/L Metolachlor OXA
Average	0.32	0.29	0.14	0.10	0.035	0.25	0.15
Median	0.19	0.15	0.11	0.10	0.025	0.18	0.11
Maximum	0.71	1.02	0.22	0.10	0.18	0.88	0.28
Detection Frequency	16%	18%	16%	2%	64%	27%	7%

n = 55 samples



Total & Methyl Water Hg for 54 NLAP lakes. Water quality standard is 6.9 ng/L. Max. T Hg = 5.2 ng/L (South Lake). Mean NLAP = 0.87 vs. Mean non-random 2.06 ng/L (102 lakes; Monson, personal communication)



Minnesota NLAP water mercury data: 2007

Sediment chemical & physical analyses

Collected samples from upper 0-15 cm.
Example analyses & data status as follows:

- Mercury (by CVAA): done
- 18 metals (ICP scan): done
- PAHs (list of 34 PAHs): not yet submitted
- Particle Size & TOC: not yet submitted
- % Moisture: done
- Emerging Contaminants: pending funding
- All data being prepared for entry into STORET
- Analysis to be conducted by MPCA Air Assessment & Environmental Data Management Section



Near-shore assessment example: Nest Lake - Physical Habitat sites: random, equally distributed & mapped in advance



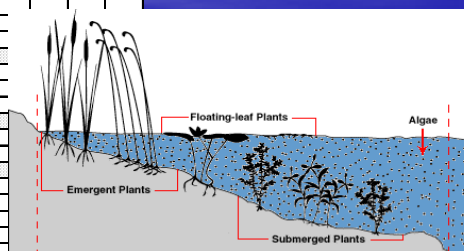
Site number		1	2	3	4	5	6	7	8	9	10
CODE	DEPTH (ft)										
NO SURVEY	SH = on shore, D= too deep										
EMT	No vegetation found										
UVC	Bladderwort										
NF	Bushy pondweed*										
R	Buttercup										
EC	Canada waterweed										
VA	Celery										
C	Chara										
POR	Clasping leaf										
CD	Coontail										
PC	Curly-leaf pondwd										
PZ	Flat-stem pondwd										
PI	Illinois pondweed										
PA	Large-leaf pondwd										
MB	Marigold										
POSN	Narrowleaf pondwd										
MS	Northern milfoil										
PR	Robbin's pondweed										
PP	Sago pondweed										
HD	Star grass										
PG	Variable pondweed										
POP	White-stem pondwd										
PN	Floating-leaf pondwd										
NO	White waterlily										
NV	Yellow waterlily										
BRS	Watershield										
SAS	Arrowhead										
SCS	Bulrush										
PHAU	Cane										
TS	Cattail										
ELSP	Spikerush										
ZIP	Wild Rice										
sediment (BO, RB, GR, SA, SI, MR, MU)											



MDNR Developed a standardized form for recording presence / absence of plants & max. rooting depth

MPCA created Access database for entry & storage of data.

MDNR to analyze data;



X = species present in 1m2 sample area / X with circle = matted plants /
0 = found in lake but not in survey point

Nest Lake Site G P-Hab & Macrophyte Assessment

Littoral assessment

Macrophyte:

- >75% macrophyte cover
- 12 species of emergent, submergent or floating-leaf
- Max rooting depth 5-10 feet



Considering including near-shore assessments in future lake assessments

Nest Lake P-Hab Site E

Littoral Assessment

Macrophyte:

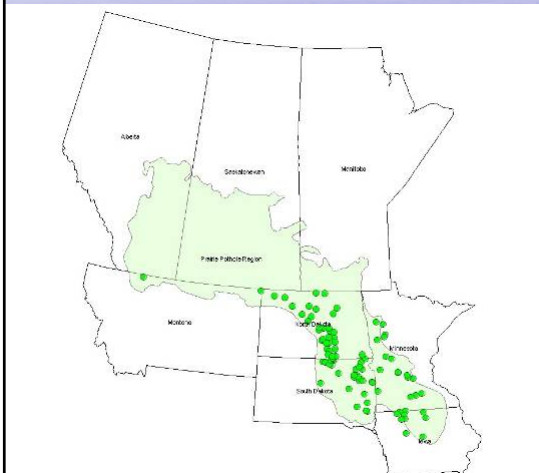
- < 10% macrophyte cover
- 8 species of emergent, submergent or floating-leaf
- Max rooting depth 5-10 feet



Lake IBI

- MDNR has development a lake IBI (based on comprehensive fishery assessments); however development & testing has been limited to just a few areas & lake types.
- NLAP allows expansion of this metric to new lakes and regions;
- Provide a good basis for expanding the use of this tool in future assessments, e.g. 303(d);

Assess Lakes of the Prairie Pothole Region



ND proposal (Mike Ell)

•Multi-state collaboration:
ND, SD, MN IA;

Over 70 lakes in initial draw

Statistically describe
condition of Prairie Pothole
lakes;

Emphasize metrics
important to the health of
shallow lakes, e.g.,
maximum rooting depth of
SAV

Summary

- Minnesota drew 41 lakes & added 9 to allow for state-based assessment (MPCA & MDNR collaborators);
- Sought value-added sampling with NLAP, resulted in collaborations with:
 1. Other program areas in MPCA & MDNR;
 2. USFS to assisted with sampling in remote area (and to advance techniques);
 3. Department of Agriculture on pesticides;
 4. USGS on water Hg;
 5. Other states: ND, SD and IA -- region-wide assessment;
- Result: Data that can be used by numerous programs, several state agencies & EPA; lead to a substantial increase in our ability to assess lake condition;
- 6. Standardized reports for Web are under development

For further information

- MPCA web site for state program - <http://www.pca.state.mn.us/water/nlap.html>
- EPA website for national program - www.epa.gov/owow/lakes/lakesurvey/

